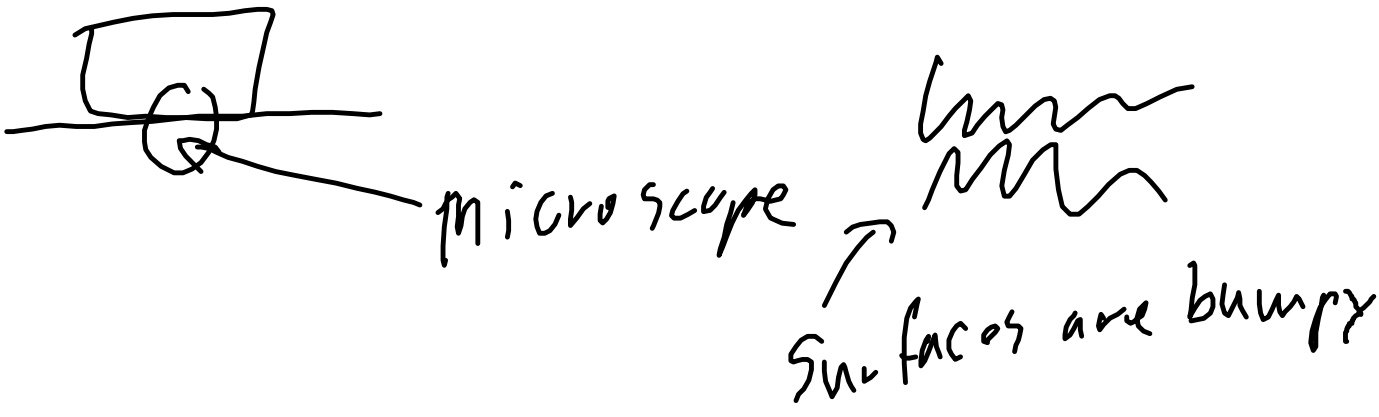
Lab - factors that influence Friction
elevator problems
group quiz
individual quiz next class

Lab
Factors that influence the force of friction
the force between the surfaces, we call that the normal force, F_N had the most effect.

If you doubled the number of blocks, increasing that force, the friction doubled.

the coefficient stayed pretty constant.

the coefficient of friction, μ, depends on the surfaces in contact. Rougher surfaces tend to have more friction, like sandpaper. Rubber has a high coefficient of friction because



is changes shape and squishes into the bumps

static friction (not sliding) is larger than sliding friction because the bumps mesh together rather than skip along.

Don't spin your tires or lock your brakes when you drive because you lose traction (friction). In the snow, if you spin your tires you can melt the snow and make ice.

https://www.youtube.com/watch?v=L4BuFrruLRs

Keep your wheels moving with the ground.

Elevator problem

1. A 50.0 kg student is standing on a scale in an elevator. The scale reads in newtons. What does the scale read

a) when the elevator is not moving?
b) when the elevator accelerates up at 2.0 m/s^2?
c) when the elevator moves at a constant 3.0 m/s up?
d) when the elevator slows to a stop from 3.0 m/s in 2.0 s?
e) when you cut the cable and the elevator falls freely at 9.8m/s^2.

2. You pull a wooden block with a force scale. If you lift the block and the scale reads 3.5N and then you pull the block and the scale reads 1.0N. Determine

a) mass of the block

b) the coefficient of friction between the block and the table.

c) the acceleration of the block if you pull it with 2.0 N (assume friction stays the same).

group quiz

$W = F_g = mg$ $g = 9.80 \frac{N}{kg}$ or $9.80\ m/s^2$

$F_{net} = ma = \sum F$ ↑ sum $F_f = \mu F_N$

a is up or a is down

$ma = F_N - F_g$

Solve

$F_N = mg +/- ma$

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1. A 50.0 kg student is standing on a scale in an

elevator. The scale reads in newtons. What does the scale read

a) when the elevator is not moving?

F_N = mg +/- ma

= 50.0 kg x 9.80 N/kg
= 50x9.8=490.0
490N 4.90×10^2N

b) when the elevator accelerates up at 2.0 m/s^2?

F_N = mg +/- ma
= 490 + 50x2=590 N

c) when the elevator moves at a constant 3.0 m/s up?

a= 0 so F = 490N

d) when the elevator slows to a stop from 3.0 m/s in 2.0 s?

a= change in v/t = -3.0/2=-1.5 m/s^2
F_N = mg +/- ma
= 490-(50x1.5)=415 N = 420N

e) when you cut the cable and the elevator falls freely at 9.8m/s^2.

F = 0

F_N = mg - ma a=g

mg-mg=0

1. You pull a wooden block with a force scale. If you lift the block and the scale reads 3.5N and then you pull the block and the scale reads 1.0N. Determine

a) mass of the block

Fg=mg m=Fg/g = 3.5N/9.8N/kg = 0.36kg

b) the coefficient of friction between the block and the table.

μ=Ff/FN = 1.0N/3.5N 1/3.5=0.2857 = 0.29

c) the acceleration of the block if you pull it with 2.0 N (assume friction stays the same).

Fnet = Fa-Ff = 2.0N-1.0N = 1.0N

a= Fnet/m = 1.0N/0.36kg 1/0.36=2.7778

2.8m/s^2